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JIANQ CHYUN IPO

2004

Customer No.: 31561

Application No.: 10/064,503

Docket No.: 9170-US- 230

AMENDMENTS

In the Claims:

Claims 1-11: canceled

12. (currently amended) An apparatus for purifying air used as a raw material in

cryogenic air separation that separates nitrogen and oxygen mainly by distilling the air at low

temperatures, comprising:

an adsorber comprising an adsorption cylinder that comprises a first adsorbing layer and

a second adsorbing layer, wherein the first adsorbing layer comprises a first adsorbent capable of

selectively adsorbing water in the air and the second adsorbing layer comprises a second

adsorbent capable of selectively adsorbing nitrogen oxides and/or hydrocarbons in the air passing

the first adsorbing layer, wherein

the second adsorbent comprises an X zeolite containing magnesium ion as an ion-

exchangeable cation, and a magnesium-exchange ratio in total cations of the X zeolite is higher

than 40%, wherein the X realite second adsorbent contains merely a trace of A zeolite as an

impurity.

13. (currently amended) An apparatus for purifying air used as a raw material in

cryogenic air separation that separates nitrogen and oxygen mainly by distilling the air at low

temperatures, comprising:

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an adsorber comprising an adsorption cylinder that comprises a first adsorbing layer and

a second adsorbing layer, wherein the first adsorbing layer comprises a first adsorbent capable of

selectively adsorbing water in the air and the second adsorbing layer comprises a second

adsorbent capable of selectively adsorbing nitrogen oxides and/or hydrocarbons in the air passing

the first adsorbing layer, wherein

the second adsorbent comprises an X zeolite containing magnesium and calcium ions as

ion-exchangeable cations, and a magnesium-exchange ratio in total cations of the X zeolite is

higher than 5%, wherein the X-realite second adsorbent contains merely a trace of A zeolite as

an impurity.

14. (previously presented) An apparatus for purifying air used as a raw material in

cryogenic air separation that separates nitrogen and oxygen mainly by distilling the air at low

temperatures, comprising:

an adsorber comprising an adsorption cylinder that comprises a first adsorbing layer and

a second adsorbing layer, wherein the first adsorbing layer comprises a first adsorbent capable of

selectively adsorbing water in the air and the second adsorbing layer comprises a second

adsorbent capable of selectively adsorbing nitrogen exides and/or hydrocarbons in the air passing

the first adsorbing layer, wherein

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the second adsorbent comprises an A zeolite containing calcium and magnesium ions as

ion-exchangeable cations without an X zeolite, and a magnesium-exchange ratio in total cations

of the A zeolite is higher than 5%.

15. (previously presented) The apparatus of claim 12, wherein a third adsorbing layer is

disposed between the first adsorbing layer and the second adsorbing layer, wherein the third

adsorbing layer comprises an adsorbent capable of selectively adsorbing CO, in the air.

16. (currently amended) A method for purifying air used as a raw material in cryogenic

air separation that separates nitrogen and oxygen mainly by distilling the air at low temperatures,

comprising:

providing a purifying apparatus comprising an adsorber, the adsorber comprising an

adsorption cylinder that comprises a first adsorbing layer and a second adsorbing layer, wherein

the first adsorbing layer comprises a first adsorbent capable of selectively adsorbing water in the

air and the second adsorbing layer comprises a second adsorbent capable of selectively adsorbing

nitrogen oxides and/or hydrocarbons in the air passing the first adsorbing layer, wherein the

second adsorbent comprises an X zeolite containing magnesium ion as an ion-exchangeable

cation, and a magnesium-exchange ratio in total cations of the X zeolite is higher than 40%,

wherein the X zeolite second adsorbent contains merely a trace of A zeolite as an impurity; and

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using the first adsorbing layer to adsorb and remove water from the raw air and then

using the second adsorbing layer to adsorb and remove the nitrogen oxides and/or the

hydrocarbons from the raw air.

17. (previously presented) The method of claim 16, wherein the second adsorbing layer

also adsorbs and removes CO₂ from the raw air.

18. (previously presented) The method of claim 16, wherein the purifying apparatus is

used with a third adsorbing layer disposed between the first adsorbing layer and the second

adsorbing layer, the third adsorbing layer comprising an adsorbent capable of selectively

adsorbing CO2 and the method further comprising using the third adsorbing layer to adsorb and

remove CO₂ from the air passing the first adsorbing layer.